SD-1

The α-conotoxins and neuronal acetylcholine receptors (nAChRs)

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The predatory cone snails use their biochemically and pharmacologically complex venoms to capture prey, defend against predators, and compete with other animals in their environment. The active components of these venoms are mostly small, disulfide-rich peptides, 10–30 amino acids in length ("conotoxins"). The conserved Cys superfamily framework largely determines the three-dimensional conformation of the polypeptide backbone of all peptides that belong to the superfamily. α-conotoxin contains only two disulfide bonds and specific cystein spacing confer unique selectivity to different neuronal acetylcholine receptors (nAChRs). nAChRs are a family of ligand-gated ion channels that are expressed in many regions of the central nervous system (CNS) and peripheral nervous system. In vertebrates, nine α (α2~ α10) subunits and three β (β2 ~ β4) subunits have been cloned and studied . Functional nAChR are assembled as either homo- or hetero-pentameric channels with combination of various alpha and beta subunits. Those varieties of functional subunits combinations display unique pharmacological properties allowing different biological and physiological roles respectively.

To study specific interactions between α-conotoxins and nAChRs is very important to understand roles of nAChRs in neuronal function and development. In this presentation, I proposed that the acetylcholine binding pocket of nAChRs shares residues which are responsible for binding conotoxin. In addition, interaction between conotoxin and hydrophobic amino acid residues is main driving force and neighboring residues confer selectivity between specific conotoxin and nAChRs